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Electronic properties of nanotube-graphene composite carbon systems YEN-HUNG HO, Department of Physics, National Cheng Kung University, C.P. CHANG, Center of General Education, Tainan University o Technology, M.F. LIN, Department of Physics, National Cheng Kung University — Band structures of nanotube-graphene hybrid carbon systems are calculated by the tight-binding model. The Lennard-Jones potential is used to determine the optimal geometry for a single-walled carbon nanotube and a monolayer graphene. There exist many one-dimensional energy bands. The low energy bands are drastically changed by the interlayer atomic hoppings, such as the destruction of state degeneracy, alteration of Fermi-momentum states, creation of extra band-edge states, and modulation of energy gap. The composite systems are metals or semiconductors, which depends on the alignment and the geometry of carbon nanotube. The main characteristics of electronic structures are directly reflected in density of states. DOS exhibits a lot of asymmetric prominent peaks. The predicted results could be verified by the experimental measurements from the scanning tunneling spectroscopy.

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